

George Kenneth Tutton (1913-1992) and Mobile Neurosurgical Units during World War Two

Lois M Tutton

Redland Green Farm, Redland, Bristol BS6 7HF, UK.

Email: *loistutton@icloud.com*

Abstract

During World War Two the Allies needed to secure the coast of North Africa from the Axis forces to enable transportation of troops, machines and victuals safely across the Mediterranean to the far-flung theatres of war in Europe, Africa and Asia. This meant a concerted effort by the Allies commencing with Operation Torch in November 1942. Neurosurgery was a young specialty and survival of serious head injuries in warfare and in normal life was extremely poor. This article explores the work that made it possible for such casualties to return to the battlefield or normal life by the creation of novel Mobile Neurosurgical Units. The units and personnel, including this author's father, George Kenneth Tutton, were transported initially by sea in convoys. The role played by Mobile Neurosurgical Units in the North African Campaign and the ensuing battles in Sicily and Italy is highlighted. The use of penicillin initially was trialled by Unit Nos 4 and 5 on the encouragement of Sir Howard Florey and Sir Hugh Cairns and was then extended from the invasion of Sicily onwards to all patients with severe intracranial injuries.

Keywords

George Kenneth Tutton, Mobile Neurosurgical Units, North African Campaign, Italian Campaign, World War Two

Background

North Africa is no stranger to turmoil and conflict, having suffered under the Punic, Roman and Ottoman empires, and is still suffering up to the present day. During the 1930s Italy built up its empire there and then joined forces with Germany in 1940. In World War Two (WW2) the Allies needed to keep the Suez Canal open and sail safely

across the Mediterranean to enable a reduced transit time and free shipping to supply their troops in the Asian Theatre of war and, coupled with possession of North Africa, the Allies would have a springboard from which to invade Southern Europe.¹

During 1940-41 the 8th Army (which contained the 7th Armoured Brigade) of combined British and Commonwealth forces was fiercely fighting the combined German and Italian forces in North Africa. In early 1942 the German Afrika Corps under Rommel (1891-1944) pushed the British forces back from their gains in Libya to Egypt. In October 1942, General Montgomery (1887-1976) commanding the 8th Army launched a new British offensive pushing westwards from El Alamein. The 1st Battle of El Alamein in July 1942 was a defensive battle in which the 8th Army commanded by General Auchinleck (1884-1981) had stopped Rommel. Montgomery was in command by the time of the offensive 2nd Battle of El Alamein. In November 1942 the Allies under General Eisenhower (1890-1969) landed the 1st Army (Operation Torch) into Morocco and Algeria which were under the overall control of the Vichy French. The latter capitulated rapidly and their soldiers joined the allied forces. In retaliation the Germans landed a huge force into Tunisia. The allies then effected a pincer movement of Allied forces on to the western and eastern flanks of the Axis forces and continued to apply pressure until the Axis forces retreated from North Africa via Tunis to Sicily. Eight hundred and fifty vessels were involved in Operation Torch and only fifteen were lost.²

Ten per cent of Allied troop casualties in the North African Campaign were head injuries. Experience obtained during World War One (WW1) in Petrograd and France by Sir Geoffrey Jefferson (1886-1961), a pioneering neurosurgeon at Manchester Royal Infirmary, showed that patients with head injuries suffered an unacceptable morbidity and mortality rate due to secondary infection and brain fungus. Jefferson encouraged principles that he and Harvey Cushing (1869-1939) had promulgated, namely that success in treating head injuries was reliant initially on segregating the patients and on early neurosurgical intervention and treatment. This included total removal of bone fragments and wound debridement, and then primary wound closure.^{3 4}

One of Jefferson's acolytes, Brigadier Sir Hugh Cairns (1896-1952), was an enthusiastic neurosurgeon who held the Nuffield Chair of Surgery in Oxford from 1931.^{5 6 7} The Ministry of Health appointed Cairns as adviser to the Army on head injuries and neurosurgery. Cairns was instrumental in setting up Mobile Neurosurgical Units

¹ Mercer D. *Chronicle of the 20th Century*. London: Chronicle Communications; 1988. p.524-650.

² Anon. Operation Torch. Encyclopaedia Britannica. www.britannica.com/event/North-Africa-campaigns/Operation-Torch

³ Schurr PH. *So That Was Life: A Biography of Sir Geoffrey Jefferson, Master of the Neurosciences and Man of Letters*. London: Royal Society of Medicine Press; 1997.

⁴ Jefferson G. Head wounds and infection in two wars. In: *British Journal of Surgery, War surgery supplement No.1 (Wounds of the Head)*. Bristol: John Wright and Sons; 1947. p.3-8.

⁵ Anon. Sir Hugh Cairns. Nuffield Department of Surgical Sciences, University of Oxford. www.nds.ox.ac.uk/about-us/our-history/sir-hugh-cairns

⁶ Jefferson G. Memories of Hugh Cairns. *Journal of Neurology, Neurosurgery and Psychiatry*. 1959; 22: 155-166.

⁷ Cairns H. Neurosurgery in the British Army, 1939-1945. In: *British Journal of Surgery, War surgery supplement No.1 (Wounds of the Head)*. Bristol: John Wright and Sons; 1947. p.9-26.

(MNSUs) initially with sponsorship from Lord Nuffield and the Silver Thimble Fund, a fund set up by Miss HE Hope-Clarke (1870-1950) in WW1 from recycling donations of damaged and unwanted silver sewing thimbles and jewellery into money to pay for vital medical equipment for the armed services. Cairns also organised specialist training for the medical personnel of the MNSUs before posting. He had also ruled in 1941 that all Army motorcycle riders were to wear helmets to reduce the number of fatalities and he was instrumental in overseeing the research and resultant use of penicillin with Howard Florey (1898-1968) in the treatment of war wounds. Sir Hugh requisitioned St Hugh's College of Oxford University as the Oxford Military Hospital for Head Injuries which comprised 300 beds. Thirteen thousand neurosurgical casualties were treated there during WW2 and training for all MNSU staff was undertaken there.⁸

George Kenneth Tutton (1913-1992)



Figure 1. George Kenneth Tutton (1913-1992). Photographed by Jas. Bacon & Sons, Art Photographers, 81 Northumberland Street, Newcastle Upon Tyne, and at 17-19 Basnett Street, Liverpool. 1942. Tutton family private collection.

George Kenneth Tutton (Figure 1) was a young surgeon who, since qualifying MB ChB from Manchester University in 1939, had been in training around Manchester (House Surgeon Manchester Royal Infirmary 1939-40, Senior House Officer Macclesfield

⁸ Quare D. Oxford Military Hospital (Head Injuries). WW2 People's War. BBC. 14 August 2003. www.bbc.co.uk/history/ww2peopleswar/stories/87/a1145387.shtml

1940-41, Resident Casualty Officer 1942).⁹ He had already developed a keen interest in neurosurgery while working with Sir Geoffrey Jefferson and when called up to the Royal Army Medical Corps (RAMC) in July 1942, initially as a medical officer in the Black Watch (Royal Highland Regiment) that entitled him to wear a Tam o'Shanter bonnet with a red pompom, he took the opportunity to train in Oxford at the Military Hospital for Head Injuries for a position in an MNSU.



Figure 2. MNSU No 5. Photographed in Constantine *en route* for Souk Arras, mid-1943. Tutton family private collection.

Tutton was posted to join MNSU No 5 (Figure 2) commanded by Joe Schorstein (Shoreston) (1909-1976), the unit to work closely with MNSU No 4 commanded by Kenneth Eden (1910-1943). Tutton left for North Africa, probably from Liverpool,¹⁰ in early December 1942 accompanied by his kit (Figure 3) and soon after marrying. He was accompanied by fellow surgeon Richard P Jepson (1918-1980),¹¹ neurologist Charles William Michael Whitty (1913-1996), and Thomas Cecil Grey (1913-2008) as anaesthetist.

⁹ Tutton, George Kenneth (1913-1992). Plarr's Lives of the Fellows, Royal College of Surgeons of England. <https://livesonline.rcseng.ac.uk>

¹⁰ Jepson M. Professor RP Jepson (Recollections of Richard Jepson's life by his wife Dr Mary Jepson). South Australian Medical Heritage Society. Website for the Virtual Museum. http://cdn.samhs.org.au/RP_Jepson.pdf

¹¹ Jepson, Richard Pomfret (1918-1980). Plarr's Lives of the Fellows, Royal College of Surgeons of England. <https://livesonline.rcseng.ac.uk>



Figure 3. Tutton's kit: sleeping bag with 'wanted on voyage' on the back and his black 'tin box' (wooden trunk lined with metal to resist termites). Tutton family private collection. Photographed by the author.

Mobile Neurosurgical Units

The MNSUs provided specialist teams to triage and treat head injury casualties within 24-48 hours of wounding and were attached to either a hospital, a Casualty Clearing Station or a field ambulance.^{12 13 14} This enabled the postoperative sharing of facilities including beds and nursing, catering, laundry, pathology and radiological services. The composition of MNSUs included personnel and equipment.

Personnel

- Neurosurgical Specialist/s (Major or more senior)
- 2 Anaesthetists (Majors)
- 1 Neurologist (Major)
- 2 General Duty Surgeons (Royal Army Medical Corps Officers: Major, Captain or Lieutenant)
- 2 Operation Room Assistants
- 2 Batmen (Drivers)
- 2 Theatre sisters (Queen Alexandra's Imperial Military Nursing Service)

¹² Cairns. Neurosurgery in the British Army, 1947 (Note 7).

¹³ Schurr PH. The evolution of field neurosurgery in the British Army. *Journal of the Royal Society of Medicine*. 2005; 98: 423-427.

¹⁴ Hughes JT. Hugh Cairns (1896-1952) and the mobile neurosurgical units of World War II. *Journal of Medical Biography*. 2004; 12: 18-24.

Equipment

- 2 Trucks (30 cwt and 3 tonnes) containing electricity generator, tentage and water supply
- 2 Operating tables
- Suction apparatus
- Surgical Diathermy
- Illumination (theatre lighting)
- Sterilisers.
- At least two sets of neurosurgical operating instruments and one general set (enough to carry out 200 neurosurgical operations without replacements)

Across the Sea to North Africa

Charles Crosland (1918-2005), uncle of the present author, went as a non-commissioned volunteer with the Friends Ambulance Unit. Crosland wrote a diary¹⁵ while serving with them and here follows verbatim the extract relating to his transportation by sea to Suez in March 1941, illustrating the journey which surely must have been similarly experienced by Tutton and others involved in Operation Torch:

Thursday 20 March

Train from London to Glasgow, a lot of RAMC men on train also. Travelled north via York, Newcastle, Edinburgh to Glasgow. Night traveling, poor feeding, foul atmosphere, little sleep.

Friday 21 March

Arrived King George Vth dock, Greenock at 5.30am. Climbed out of the train into rain, dark and cold only to be told our boat would not be in before 9.00am. Spent the next hours in a large shed by the quay, Steve and I dozed in a big basket. Dawn was cold and windy. By 8.30am our ship was finally manoeuvred alongside the quay, after having been blown against it once. We were a sorry crowd! Tired, cold, grubby and hungry - sailing in rough weather would be the end!

Embarked onto RMS Otranto, Orient Line, 18,000 tons after some delay and allocated our cabins. Excellent Warrant Officers cabin middle of C deck, central position reasonably away from waterline torpedo explosions and least prone to movement in rough weather. Towed down the Clyde past the shipyards where many ships under construction and bomb damage evident along river. As the Firth opened out saw many ships lying at anchor.

As dusk fell signals flashing, searchlight beams behind the hills, warships, buoys, mouth organs playing and singing from the lower decks. Our boat sat in Firth until 25th March gathering ships for the convoys. 35 ships in sight with 4

¹⁵ Charles Crosland. The Years of War 1939-1946 (from diaries written during 1940-1944). Tutton family private collection.

others as big as the Otranto. Walked 10 times round the deck this morning, 8 times round is one mile. 20 ships in our convoy.

Saturday 22 March

Up at 7.00am, washed and shaved in cold water in cabin. Breakfast 7.30am in Sergeants mess. Boat drill 10.00am. "Standing easy" for 1 hour.

A steward has told us only hot salt water will be available for baths (soap useless) and he didn't think if ship torpedoed there would be any chance of getting lifeboats into the water or of getting in one! Played bridge in Warrant Officers smoke room, enjoyed ourselves, piano going well and loud singing.

Sunday 23 March

Really beautiful day, clear sky, bright sun, smooth water in the Firth, green hills rising from the water patterned with dark clumps of trees and white patches of snow. Bridge again this evening.

Monday 24 March

10.00am boat drill. 2-30pm-4.30pm orderly room duty. Game of bridge in cabin this evening. Engines of ship running intermittently in preparation for moving off. Mixed feelings about that. Drink of whisky (4d) after dinner and bridge in cabin this evening.

Tuesday 25 March

Steward woke us with news that "we are well on our way". Feel slight vibration and hear creaking and uneasy motion of ship. I realise now that we were in danger day and night until end of voyage. 20 ships in convoy with some larger than Otranto, including French liner Louis Pasteur (only one funnel). This ship had been taken from her shipyard whilst still incomplete by skeleton crew of Free French determined to escape themselves and deny use of ship by Germans.

Convoy escort includes a Battleship, two cruisers and seven or more destroyers which gives a sense of security in case German pocket battleships break out of Brest.

Weather moderate to rough with damp sea rain blowing across, heading NW with frequent minor changes of course calculated to make it difficult for a submarine to "lie in wait". Motion of ship increased and feeling queasy. Instructed to sleep in our trousers and under, not in, our sleeping bags with greatcoats and emergency packs handy! Put our watches back an hour.

Wednesday 26 March

Slept fairly well having survived the night. Weather much the same but sea rougher. Had a cold bath and did some 'jerks', Eno's Fruit Salts proving a staunch ally. Waves now breaking over the bows. Warships go through the waves rather than over them and watching as the sun breaks through they are ringed in rainbows with white foam flying from the bright and tossing sea with the rest of the convoy wet and shining, is quite an experience.

Thursday 27 March

Woke to a beautiful morning. Good swell running but much calmer. Brilliant sunshine and blue sky. Convoy looks impressive against moving white clouds with destroyer sailing alongside. Our lower decks are covered in reclining soldiers, accordion playing the old favourites and the lads taking up the choruses. Impromptu sing-song in W.O smoke room, a pleasant ship's lounge panelled in light wood and well lit. Writing this in my bunk wearing trousers and pullover over pyjamas, ship still rising and falling. Last night turned South.

Friday 28 March

Still progressing southward but with periodic changes of course which must appreciably increase the distance that we sail. Weather pleasant and warm, sea much calmer. Most of the escort left this morning and left with a destroyer and a battleship concealed between two of the larger ships. One of the larger liners left the convoy today and headed off to Canada.

Saturday 29 March

Up at 7.15, cold bath then breakfast. Exercise session in sunshine on top deck in shirts and vests gentle stuff but searching. After boat drill stood in sun leaning against rail for quite a time. The weather is much warmer and sea has been smooth all day.

After lunch we sighted the Azores, two islands 80 miles away. If we can see them can folk there see the convoy? We hope not!

Spent the afternoon in the same leisurely fashion, a pleasant change from the cold, discomforts, unpredictability and bouts of fevered activity of recent weeks. The flying boat from our escorting destroyer flew round over the convoy. A submarine alert? There was one last night we were told.

I often wonder when writing this if I am wasting my time – will we finish this voyage together, my diary and me? I somehow feel that we will – “it can't happen to me!”

Through Algeria and into Tunisia

MNSU No 5 followed the Allied push eastwards through Algeria into Tunisia following battles with the Axis forces and met up with MNSU No 4 coming westwards with the 8th Army. (Figure 4) Some of Tutton's photographs¹⁶ were found after his death in the depths of a filing cabinet while clearing the family home. He had written details on the back of the photographs.¹⁷

¹⁶ Tutton family private collection of photos, papers and books.

¹⁷ Tutton LM. Neurosurgery and the North Africa Campaign in World War 2, *Bristol Medico-Historical Proceedings*. 2008-12, 6: 159-171.

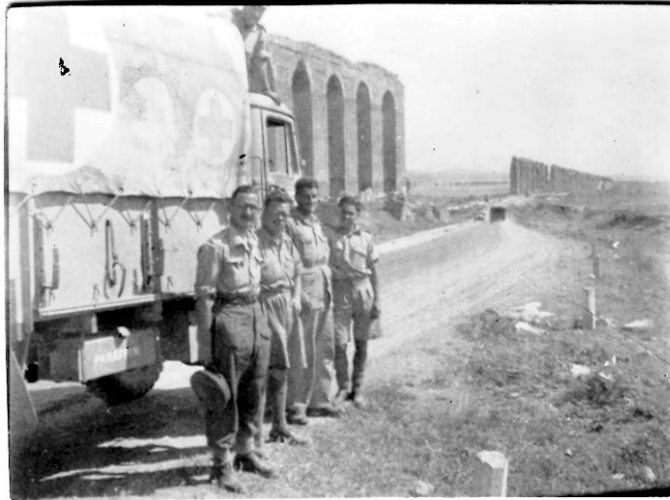


Figure 4. On the Pont du Fahs road, meeting MNSU No 4 truck by Aqueduct Ruins, June 1943. GK Tutton is standing on the far left. Tutton family private collection.

The images seem to follow the battlefronts.¹⁸ General Hospitals (GHs) were mainly tented establishments and wherever possible were set up next to a large building which was commandeered to be used for operating theatres, for example at Skikda (previously named Phillippeville) (No 100 GH) (Figure 5) and also at Oued Athmania (No 31 GH) (Figure 6). Figure 7 shows some aspects of life at No 31 GH. When a suitable building was unavailable, a tented operating theatre was the norm as at Souk Arras (No 84 GH) (Figure 8). All these sites were near Constantine, Algeria.



Figure 5. No 100 GH, Pavilion, Phillippeville (now Skikda), February 1943 to January 1944. Left: operating theatre. Right: head injury ward. Tutton family private collection.

¹⁸ Anon. Locations of British General Hospitals during WW2. Taken from documents held at The National Archives: W0222/1568. www.scarletfinders.co.uk/112.html



Figure 6. No 31 GH at Oued Athmania, December 1942 or later. Left: Tents to the right; Officers mess in small house at centre. Right: operating theatre. Tutton family private collection.

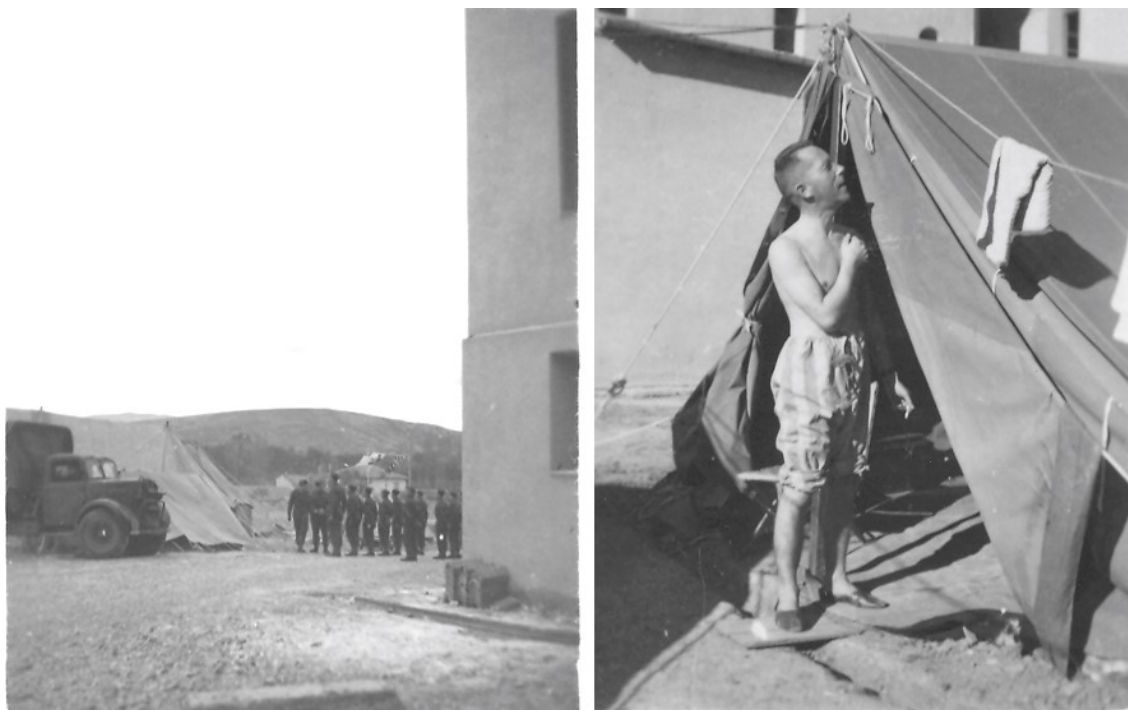


Figure 7. No 31 GH at Oued Athmania, December 1942 or later. Left: church parade. Right: morning shave. Tutton family private collection.



Figure 8. No 84 GH at Souk Arras, June to December 1943. Clockwise from top left: operating theatre tent; patient on operating table; operation in progress; camp and mud! Tutton family private collection.

Retreat into Italy

The Axis forces were pushed back from Tunis into Sicily and then back into Italy. Over 86,000 Prisoners of War (POWs) were removed from Algiers by the Allies. Figure 9, dated 27 May 1943, shows some of them marching to embarkation. Interestingly this author's father-in-law, Arthur Goddard (1920-2017), also spent time in Algiers cataloguing the POWs and arranging their repatriation. Head injury casualties from the Allies' push into Sicily and Italy were brought back to Tunisia for treatment by MNSU No 5 based in Sousse (No 71 GH) (Figure 10) and Phillippeville (now Skikda) in Algeria. MNSU No 5 went to Naples once it was secured by the Allies and was attached to No 65 GH from November 1943 to September 1945 (possibly in the existing Military Hospital based in the Abbey Santissima Trinità delle Monache). Tutton travelled to Italy in a Douglas DC-3 which had lost its cargo door and he much enjoyed flying low over the Mediterranean to Naples and taking in the excellent view! No 65 GH was moved up to Caserta north of Naples in September 1945 until it was disbanded in June 1946.

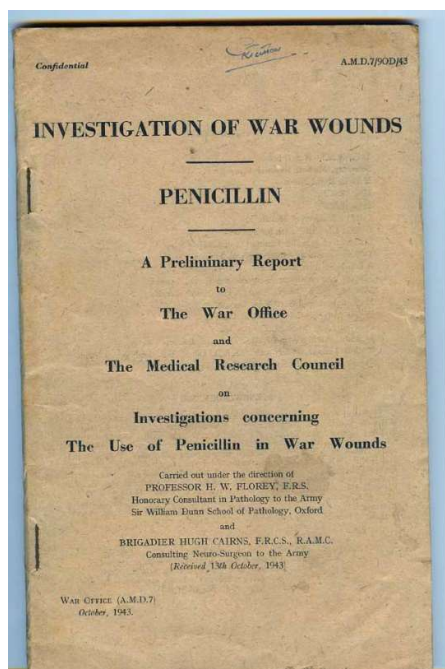


Figure 9. POWs in Algiers, 27 May 1943. Tutton family private collection.



Figure 10. No 71 GH at Sousse (June to December 1943); pipe band of Black Watch, Queen Alexandra's Imperial Military Nursing Service sisters in foreground, mess tent (left by Italians) and Officers tents in background. Tutton family private collection.

MNSU Nos 4 and 5 participated in the trials on the use of topical penicillin in war wounds in the Sicily Campaign. This led to a preliminary report to the War Office and the Medical Research Council, carried out under the direction of Professor (Sir) Howard Florey (1898-1968) and Brigadier Hugh Cairns and published in 1943. This report formed the basis for the setting of policy and the protocol on penicillin use for the duration of the war. Tutton's contribution to this report was a section on soft tissue wounds at No 71 GH (Figure 11).¹⁹ It is worth noting that Case 2 was the first case from the Battle of Sicily where an infected wound was successfully closed with the additional aid of penicillin.



SECTION 28.
SOFT TISSUE WOUNDS AT NO. 71 GENERAL HOSPITAL.
Captain G. K. Tutton.

Case	Site	Size	Age	Penicillin	Healing	
1. Lt.-Cdr. A.	Abd. wall Forearm Forearm Chest wall Amput. finger	5 x 3 cm. 6 cm. 6 cm. 12 cm.	4 hrs. 4 hrs. 4 hrs. 4 hrs.	} Solution 27,500 U. 3 days' Powder Powder	Complete union Complete union Complete union Complete union Incomplete union	
2. Pte. J.	Thigh Thigh	5 x 2 cm. 7 x 3 cm.	7 hrs. 7 hrs.		} Solution 84,500 U. 4 days	Complete union Complete union (Subsequent small abscess in wound due to <i>B. pyocyaneus</i> .)
3. Pte. D.	Shoulder	9 x 6 cm.	3½ days		Solution 7,250 U. 3 days	Complete union
4. Lt. E.	Forearm Upper arm		4 days 4 days		Powder Powder	Complete union Incomplete union
5. Pte. D.	Back Back	6 x 3 cm. ?	5 days 5 days		Powder Powder	Complete union Incomplete union
6. Pte. R.	Shoulder	6 cm.	5 days	Powder	Complete union	
7. P.O.W.	Amput. upper thigh Septicaemia		 10 days	Solution (local) 47,500 U. Na. Pen. I.M. & I.V. 270,000 U.	Wound at first left open. Prompt healing after secondary suture. Recovery from septicaemia.	

Case 2 in the above table is of particular interest as the first case from the Battle of Sicily in which wounds were closed with the aid of penicillin.

Figure 11. Preliminary report on use of penicillin to the War Office and Medical Research Council. Left: cover. Right: Table from Section 28, page 85, prepared by Captain GK Tutton. Tutton. Tissue wounds, 1943 (Note 19). Tutton family private collection. Photographed by the author.

A comprehensive report on penicillin in warfare was published as a special issue of the *British Journal of Surgery* towards the end of the war (Figure 12).²⁰

¹⁹ Tutton GK. Tissue wounds at No 71 General Hospital. In: *Investigation of War Wounds. Penicillin. A Preliminary Report to the War Office and The Medical Research Council on Investigations concerning The Use of Penicillin in War Wounds*. War Office, October 1943 (A.M.D.7/90D/43). Section 28. p.85-86.

²⁰ Penicillin in Warfare. *British Journal of Surgery. Volume 32. Special Issue*. Bristol: John Wright and Sons; 1944.

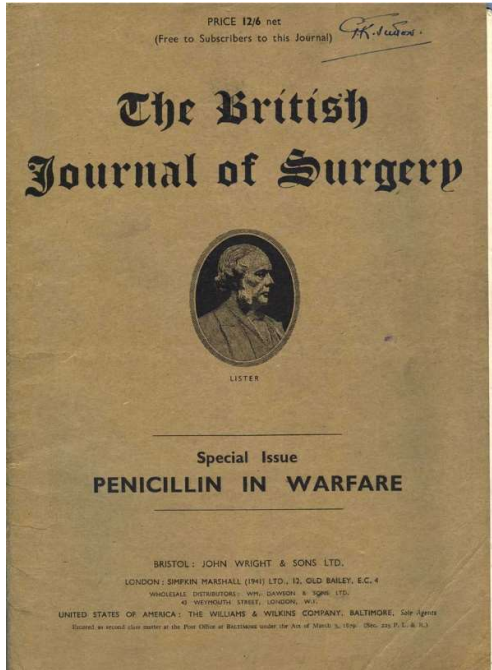
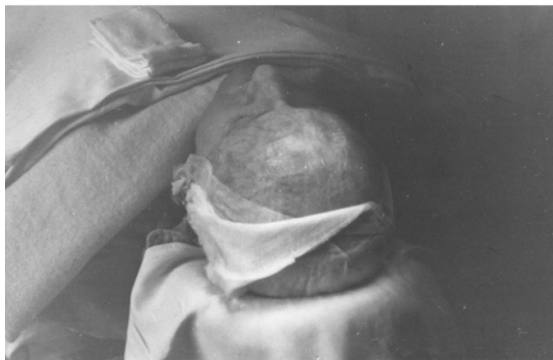


Table III.—PRIMARY CLOSURE OF NON-PENETRATING HEAD INJURIES

	SKULL FRACTURED		SCALP WOUND ONLY		TOTAL	INFECTED
	No. of Cases	Infected	No. of Cases	Infected		
With penicillin-sulphathiazole powder	73	9	151	2	224	11
With sulphanilamide-proflavine powder	21	7	106	8	127	15

This table was prepared by Captain G. K. Tutton from the records of a neurosurgical unit (O.C., Major J. Shoreston). The wounds of the penicillin-sulphathiazole series were slightly older than those of the sulphanilamide-proflavine series, but the majority of wounds in both groups were less than 72 hours old at the time of suture.

Figure 12. Special issue on penicillin in warfare. Left: cover. Right: Table with results from MNSU No 5 showing Tutton's contribution in the trial. Penicillin in Warfare, 1944 (Note 20). Tutton family private collection. Photographed by the author.



PRIMARY SKULL CLOSURE WITH ACRYLIC PLATES 257

Table II

Type of Wound	Frontal	Occipital	Temporal	Parietal
Missile wound, dura torn	17	5	2	1
Missile wound, dura intact	8	5	1	5
Compound fracture, dura torn	2	0	0	0
Compound fracture, dura intact	1	1	0	2
Total	28 (58 per cent)	9 (19 per cent)	3 (6 per cent)	8 (17 per cent)

DISCUSSION

There is no lower limit to the size of a bone defect which it is unnecessary to cover. In practice, a proper removal of depressed bone never

leaves an opening less than 2 to 3 cm. in its longest diameter and a defect of that size may worry the patient even if it is in the hairy scalp. Bone defects of more than 6 cm., in the longest diameter, are rare in patients whose neurological state makes them eligible for immediate skull repair, unless the wound chiefly affects the forehead.

We have not used the method in the large forehead defects, because an accurate fit is difficult to obtain with preformed plates where the contour of

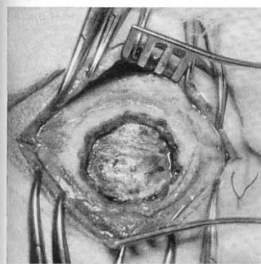


FIG. 236.—The bone defect.

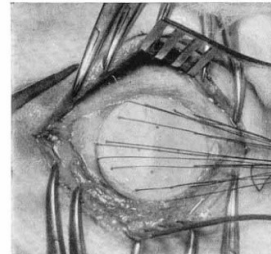


FIG. 237.—The acrylic plate threaded.

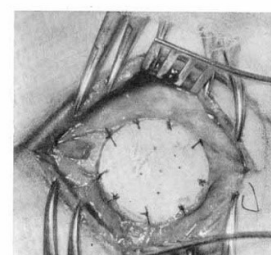


FIG. 238.—Suturing of plate completed.

Figure 13. Primary skull closure. Left: patient ready for surgery. Right: illustration of acrylic plates used for primary bone closure of the skull. Schorstein. Primary skull closure, 1947 (Note 21). Tutton family private collection. Photographed by the author.

The use of poly-methyl methacrylate to make moulded plates which could be sewn 'in situ' at operation in order to replace lost cranial bone and achieve primary closure was developed by MNSU No 5 under Joe Schorstein. (Figure 13).²¹

By treating head injuries within 48-72 hours of wounding the incidence of infection, brain abscess, meningitis and brain fungus was reduced from 25% to 5% and more than 90% of wounds healed by first intention. The important principle here is that the first operation on the brain should be the definitive one. Very severe cases were flown back to Oxford for treatment at the Oxford Hospital for Head Injuries. Penicillin was applied directly into and on to wounds either in solution via embedded rubber tubes or in powdered form administered using an insufflator (Figure 14).

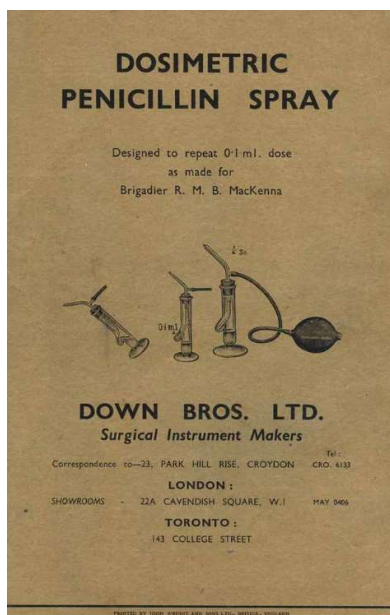


Figure 14. Advertisement for penicillin spray from back cover of *British Journal of Surgery* special issue. Penicillin in Warfare, 1944 (Note 20). Tutton family private collection. Photographed by the author.

Monte Cassino

Unit Nos 4 and 5 eventually were stationed in Naples attached to No 65 GH and treated 4,600 patients. They received many casualties from the Battle of Monte Cassino (January-May 1944), including Alfred Howard Simcocks (1915-1995), one of Tutton's fellow pupils from King William's College, Isle of Man.²²

²¹ Schorstein J. Primary skull closure with acrylic plates. In: *British Journal of Surgery, War surgery supplement No.1 (Wounds of the Head)*. Bristol: John Wright and Sons; 1947. p. 256-257.

²² Vicar of Malew Parish Church, Isle of Man. Address from Memorial Service of Alfred Howard Simcocks. 1995. Tutton family private collection.

They had chatted together in 1938 about the impending clouds of war and Howard's sister recalls her brother saying:

"I'm no death or glory boy and I don't want to die any more than the next man. But being wounded could be worse, worst of all I think would be to be blinded".

A German mine blew up under the vehicle in which he was travelling on the slopes of Monte Cassino and the driver was killed outright. Simcocks was thrown out of the vehicle and as he lay there shocked, confused and weakened by loss of blood, one insistent compulsion dominated his thoughts:

"I must stand up or they'll think I'm dead".

He struggled to his feet and, swaying dizzily, was immediately picked up and taken to MNSU No 5 close behind the front lines. As he lay waiting for attention he heard a voice he seemed to recognise:

"That's not Ken Tutton by any chance is it?"

It took a moment or two for Major Tutton, the Medical Officer, to realise he was looking down on the mutilated features of his old school friend. Tutton managed to save his friend's life but not his sight. Howard Simcocks felt he had been given a second chance to live and post war he led a full life in the Isle of Man training in the Law, being called to the Manx Bar and being elected to the House of Keys.

As the Allies pushed North to Rome and beyond, Tutton had a chance to walk up Vesuvius (Figure 15) ten days before it erupted in March 1944 and also to study for and then pass his FRCS examination. He was promoted to Lieutenant Colonel in September 1945 and was put in overall charge of a Surgical unit in Naples but was not de-mobbed until November 1946.



Figure 15. Trip up to the crater of Mount Vesuvius two weeks before eruption, March 1944. Left to right: Bill Mill, Tim Merrington, Brigadier Sir Hugh Cairns and GK Tutton. Tutton family private collection.

After the war

Tutton's neurosurgical training continued at Manchester, Oxford and Queen Square. He obtained his Master of Chirurgery, ChM, from Manchester in 1953 with a thesis on Cerebral Abscess and he was Hunterian Professor at the Royal College of Surgeons in the same year, giving his lecture there on 'Cerebral Abscess - The Present Position' on 15 March 1953. He spent a year in Boston in 1954 training under neurosurgeon Bertram Selverstone at New England Center Hospital. Tutton had gained valuable experience before moving to Preston, Lancashire, where he held the post of Consultant Neurosurgeon from 1955 to 1988 and he set up the Neurosurgical unit there.

Conclusion

UNIT	DATES	THEATRE OF WAR	TOTAL ADMIS-SIONS	TOTAL OPERA-TIONS	GUNSHOT WOUND HEAD		REMARKS	BIBLIOGRAPHY
					Non-penetrating	Penetrating		
1	June, 1940	France	800	—	—	—	Captured	
	Nov., 1941, to Feb., 1942	Western Desert	—	134	—	15		Miller, D. ("Infective Complications of Head Battle Casualties", <i>Asst. N. Z. J. Surg.</i> , 1942, 12, 53)
	Feb., 1942, to June, 1945	Cairo	3804	—	343 (Up to Feb., 1944)	534 (1944)	Dealt with cases from an area enclosed by Asmar, Baghdad, Mosul, Tripolitania, including cases evacuated from No. 4 M.N.S.U. between Dec., 1942, and Oct., 1943	<i>J. R. Army med. Cps.</i> , 2 extracts Ascroft (1943, a, b, c, d) McKenzie, D. (1944) Kremer (see footnote, p. 21)
2	March, 1942, to June, 1945	Poona, Bangalore, Dimapore, Burma (14th Army)	—	—	—	443 (1944 only)		Hickey (1944, 1945)
3	July, 1942, to June, 1945	Ranchi, Bareilly,* Imphal, Comilla	2045†	1200*	—	1100	* Including peripheral nerve injuries † Including 235 cases from No. 2 M.N.S.U. during Burma campaign of 1945	Johnson and Dick (1945) Johnson (1946, 1947) Johnson (see Cairns, Daniel, Johnson, and Northcroft, 1947) Johnson and Dutt (1947)
4	Dec., 1942, to June, 1945	North Africa (8th Army), Sicily, and Italy	6063	4334	3013	1336	Usually split into forward and rear sections	Eden (1943) Cairns, Eden, and Schorstein (1943) Gillingham (1944, 1945, 1947) Connolly (1947) Slemmon (see footnote, p. 13) <i>Brit. med. J. and Lancet</i> (K. Eden's obituary)
5	Dec., 1942, to June, 1945	North Africa (1st Army), Italy	4600	—	1350‡	889‡	‡ Includes only cases primarily operated on in Unit In Italy, usually split into forward and rear sections	Schorstein (1944, 1945, 1946, 1947, a, b, c) Cairns, Eden, and Schorstein (1943) Jepson and Whitty§ (1946) Clarkson and Schorstein (1945) Blackburn, G., and Jepson, R. P. ("Spinal Extradural Abscess", <i>Brit. med. J.</i> , 1946, 2, 297) Whitty, C. W. M., ("Animal Behaviour and Human Biology", <i>Rass. Biol. Umana</i> , 1946, 1, No. 1)
6	June, 1944, to June, 1945	Normandy to Germany (21 Army Group)	3100	1125	989	1110	Sometimes split into forward and rear sections	Small and Turner (1947) Small, Turner, and Watt (1947) Watt (1947)

§ Jepson, R. P., and Whitty, C. W. M., "On Sulphadiazine Dysuria" *Lancet*, 1945, 1, 751; 2, 321; "Purulent Meningitis", *Ibid.*, 2, 415; "Pneumococcal Meningitis after Head Injury treated with Intrathecal Penicillin", *Ibid.*, 1946, 1, 228; "Medicina e Societa", *Societa* (Einandi, Florence), 1946, 1; "Contribuzione a una fisiologia di etics", *Rass. Biol. Umana*, 1946, 2, No. 1.

Figure 16. Summary of the work of MNSUs with the British Army Overseas. Data taken from Table 1. Cairns. Neurosurgery in the British Army, 1947 (Note 7). p.11. Tutton family private collection. Photographed by the author.

The MNSUs set up during WW2 treated 20,000 patients (Figure 16).²³ This included 80% of all head injuries of the troops. Of those who had scalp wounds and skull fractures only, 90% returned to their units and continued fighting. Seventy per cent of those with brain wounds who were treated were employable on recovery. Kenneth Eden compared the pre-MNSU results of the general surgeons at El Alamein with the results post MNSU and found that the specialised neurosurgical teams obtained 97% primary union of scalp wounds compared to 50% by the general surgeons, 84% survival rate compared to 12% for wounds with intact dura, and a 71% survival rate compared to 25% for wounds including the brain.

A huge body of data was collected on all the patients treated by the MNSUs and those treated at the Oxford Military Hospital for Head Injuries which on analysis helped move neurosurgery into a successful specialty of the twentieth century. Record cards accompanied each patient, detailing their injury, treatment, operation and recovery. On discharge these cards were returned to Oxford for analysis (Figure 17). Many of the patients treated by the MNSUs and the Oxford Military Hospital for Head Injuries were followed up post war by Charles Whitty and his neurologist team until death and then where possible the brains were examined by the Oxford neuropathologists including John Trevor Hughes (1930-), progressing neurosurgery to its modern-day level of excellence. A large debt of gratitude is owed by those who survived horrific head injuries to the neurosurgical services provided by the MNSUs and to the perspicacity of a few surgeons in facilitating the mobilisation of specialist teams to the very theatres of war and their detailed recording of their efforts.

Operation Card for Head Injuries.
 (For distribution to Casualty Clearing Stations, Stationary and Base Hospitals.)
 (Field Card No. W. 3118c should be filled in before operation.)

Name: _____ Rank: *Rfan.*
 Unit: *1st London Div. Rifes. H.Q.*
 Date of operation: *19.12.42* Time (in hours) between injury and operation: *5.0 hrs.*
 Situation of wounds (enter on diagrams): *@ Occipital.*
 X-ray findings: Fracture? *yes* F.B.? *no* Site of F.B.? -
 (Mark X-ray findings on diagrams.)

Name of operator: *P.K. Tutton, Capt. 5MNSU*
 Anaesthetic employed: *Local: Purocal.*
 Dura: Torn? *no* Intact? *yes*
 Brain: Bruised? *yes* Lacerated? *no* Intact? *yes*
 If infected? *Hem. Staph. 2* By what organism? *yes*
 Other findings: *Previously excised wound - @ occipital. Dura Tissue #.*

OPERATIVE TREATMENT:-
*Re-excision: Removed # bone: byzest enlarged
 To 3 cm. Dura intact. Dura over layer
 Ten over sinus area. No evidence of dural defect.
 Hematoma: 2 layers closed & Penicillin tabs.
 Igu. P.P.*

What foreign bodies removed? _____
 Drainage? _____
 Signature: *P.K. Tutton, Capt.*

Figure 17. Example of operation card for head injuries, Army Form W3118c. Tutton family private collection. Photographed by the author.

²³ Cairns H. Neurosurgery in the British Army, 1947 (Note 7).

Biographical Details

Lois Tutton MSc BDS is a retired Dentist who trained at University College Hospital Dental School (UCHDS), London from 1971-1975, qualifying with honours in Medicine and Surgery. Her first job was in the Paediatric Dental Department at UCHDS and then she worked for a year in general dental practices in Peckham and Croydon before moving to Bristol where she set up and ran her own dental practice. Later, she completed an MSc in Dental Radiology in 1997 at Kings College Dental School, University of London. Lois is a past President of the Bristol Medico Chirurgical Society and has just served a four-year term as President of the Bristol Medico-Historical Society during which time she was pleased to help host the British Society for the History of Medicine biennial Congress in Bristol in September 2019.

Acknowledgements

This author records her thanks to her husband for his constant encouragement, patient help and support and to her parents for not throwing away the photographs, books and papers which form the backbone of this story. Also thanks to my cousin Dr Elizabeth ‘Buff’ Maycock, an anaesthetist in Brisbane, Australia for permission to use part of her father’s diary writings and also to Dr John Trevor Hughes for advice. Special thanks to the Editorial Team for their patient editing and attention to detail.

Sources of Funding

The author has not received any funding in support of this work.

Tutton LM. George Kenneth Tutton (1913-1992) and Mobile Neurosurgical Units during World War Two. *Topics in the History of Medicine*. 2021; 1: 70-88.

Topics in the History of Medicine is an Open Access publication of the British Society for the History of Medicine made available under a Creative Commons Attribution-NonCommercial 4.0 International Licence which allows unrestricted redistribution in any medium or format for non-commercial purposes provided the original work is properly credited. <https://bshh.org.uk>

© *The Author(s)*, 2021.